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Social problem solving in chronic pain: An integrative model of coping predicts mental health

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Abstract

Despite several models of coping have been proposed in chronic pain, research is not integrative and has not yet identified a reliable set of beneficial coping strategies. We intend to offer a comprehensive view of coping using the social problem-solving model. Participants were 369 chronic pain patients (63.78% women; mean age 58.89 years; standard deviation = 15.12 years). Correlation analyses and the structural equation model for mental health revealed potentially beneficial and harmful problem-solving components. This integrative perspective on general coping could be used to promote changes in the way patients deal with stressful conditions other than pain.

1. Introduction

Research so far has failed to identify a clear and reliable set of beneficial coping efforts in chronic pain [24,36]. There may be several reasons for the difficulty in identifying these. One may be the assumption that attempts to control pain or distress represent a healthy process [24]. Another may be confusion within the common dimension of “active” versus “passive” coping, particularly as this distinction seems to depend on context [29,30,33,36].

Some attempts to bring greater clarity to the challenges of healthy coping include the misdirected problem solving model [11] and the psychological flexibility model [23,43]. Both approaches suggest that the coping context is important for understanding whether a particular pattern of coping is effective or not. From a contextual perspective, for example, coping responses can be regarded as beneficial depending on the extent to which they are performed, unconsciously, without sensitivity to the situation at hand, or without being able to change them. Despite the potential promise of these models, however, research in this area is not yet well organized.

There is a need to clarify and integrate conceptualizations of coping with chronic pain, particularly healthy coping. The social problem solving (SPS) model is one potential way of doing this. In this model, problem solving is defined as “an attempt to discover or create effective or adaptive responses to specific problems when no effective response is immediately apparent or available” [9]. It includes a motivational component which reflects one’s perception of everyday problems, named problem orientation, and proper problem-solving, which refers to the coping technique that is used [22,28].

The use of general problem-solving processes (*how* people cope), as opposed to specific coping strategies (*which* coping strategy is used), seems to be a promising

metacognitive, and contextually sensitive, approach in relation to chronic pain [46]. In addition, the fact that the focus of this model is on relevant life goals rather than the control of experience [32] is consistent with current recommendations [24].

The purpose of the present study is therefore to evaluate an integrative model of problem solving, the SPS model, as an approach to coping, and to explore its relationship to health in chronic pain patients. Given the extant literature we expect SPS components involving high self-efficacy and psychological flexibility to be associated with better health, whereas SPS facets addressing low self-efficacy, avoidance and impulsiveness to be associated with poorer health. The SPS model addresses general stressful situations in a person's life rather than a specific problem such as pain, and it focuses not on specific coping efforts but on the 'meta' processes underlying coping. We believe that these aspects help to overcome some of the aforementioned limitations of context-insensitive coping categorizations, and also provide a general framework for considering wide ranging challenging experiences associated with reduced health and functioning, not only those involving pain.

2. Methods and materials

2.1. Participants and procedure

2.1.1. Patient sample

Participants were 369 chronic pain patients (63.78% women) who had their first visit at the Pain Clinic of the Vall d'Hebron Hospital in Barcelona (Spain) during 2010 and 2011. The age of all participants was above 18 (mean = 58.89 years; SD = 15.12) and had been experiencing pain for between 3 months and 40 years (M = 100.02 months, SD = 108.92 months). Most participants reported low back pain as the primary site of

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pain (64.2%), while neck pain (9.6%), post-surgery pain (7%) and osteoarthritis (6.8%) were less frequent.

2.1.2. Procedure

One month before their first visit at our Pain Clinic, patients were sent a letter accompanied by a research information sheet. The information included an explanation of the purpose, procedures and risks of the study, as well as contact information for the lead author (C.S.), an informed consent form, and the two questionnaires (see below). Patients returned the questionnaires when attending their first visit at the clinic.

2.1.3. Ethics

The study was approved by the ethics committee of the Vall d'Hebron Hospital (internal reference code, PR(ATR)59/2010).

2.2. Questionnaires

2.2.1. Social Problem Solving Inventory - Revised

We used the Spanish adaptation of the Social Problem Solving Inventory - Revised (SPSI-R) [22]. This instrument evaluates two aspects of an individual's problem solving in real-life social environments: problem orientation and problem-solving skills.

Problem orientation is considered to be stable schemas related to the person's appraisal of everyday problems which can either facilitate (positive problem orientation, PPO) or inhibit (negative problem orientation, NPO) the initiation of problem-solving activities. PPO refers to the tendency to see problems as opportunities or achievable challenges and to perceive oneself as efficient in problem solving, whereas NPO reflects an

inclination to view problems as harmful and to perceive oneself as being incapable of managing the negative emotions that might accompany the problem [22,28].

Problem-solving styles refer to the approach that a person uses to solve a problem, namely rational problem solving (RPS), avoidant strategies (AS) or impulsive/careless strategies (ICS). RPS consists of a systematic effort to cope with a problem and is considered to reflect constructive problem solving in four steps: problem definition and formulation, generation of alternative solutions, decision making, and implementation and verification. AS refers to the tendency to wait passively for problems to resolve spontaneously, or to procrastinate and to depend on others to solve one's problems. Finally, ICS is conceptualized as an inclination towards impulsive, incomplete and hurried efforts to solve problems. Both AS and ICS are considered to be dysfunctional. The SPSI-R has been shown to have good psychometric properties, with all reliability coefficients being higher than 0.88, except for PPO. The five-factor structure also showed a good fit (root mean square error of approximation = 0.060) [22].

2.2.2. Health

We used the Spanish adaptation of the Short Form-36 (SF-36) Health Survey [2], a widely used measure which evaluates physical and mental components of health. The physical dimension covers the extent to which patients are able to function at work or in related activities (physical role) and during normal activities of daily living (physical functioning), how much pain they experience and how much it interferes with their daily activities (bodily pain), and their perception of current and future personal health (general health). The mental health dimension refers to energy and vigour (vitality), the extent to which health problems interfere with social life (social functioning), the influence of emotions on work or daily activities (emotional role), and psychological

distress (mental health). The scale also includes composite scores for physical (PCS) and mental health (MCS). The questionnaire has good psychometric properties and it has been widely used in chronic pain populations [12,19].

2.3. Data analysis

Descriptive statistics (means and standard deviations) and gender differences (*t* tests) were computed for socio-demographic data and for scores on the problem solving and health scales.

Pearson correlations were calculated to investigate the relationship between problem solving and health. As a large number of statistical tests were performed, we set a more restrictive significance of 0.001. However, levels of 0.05 and 0.01 are also reported.

Structural equation modelling (SEM) was performed to test the model that accounts for health. Fit was assessed with the χ^2 test, the root mean square error of approximation (RMSEA) [35], the comparative fit index (CFI) [4] and the Tucker-Lewis index (TLI) [39]. A RMSEA value below 0.05 suggests a good model fit [5], as do CFI and TLI values above 0.95 [17].

3. Results

3.1. Gender differences in health

Men reported better health on many of the SF-36 dimensions (Table 1). The largest differences were observed for BP ($t = 3.234$, $p < 0.001$), RE ($t = 3.171$, $p < 0.001$) and MH ($t = 3.498$, $p < 0.001$). To a lesser extent, men also reported better PF ($t = 2.826$, $p < 0.01$), RP ($t = 2.023$, $p < 0.05$) and VT ($t = 2.428$, $p < 0.05$). Given these results, gender was included as a covariate in the SEM predicting health.

3.2. Problem solving and health

Table 2 includes correlations between the measures of problem-solving and health. These show that problem-solving orientations and skills were highly correlated with general health. While PPO and RPS were linked to better perceived health, the opposite relationship appeared with NPO, ICS and AS.

Regarding the remaining physical components, only NPO and, to a lesser extent, AS had strong significant associations with SF.

With regards to mental health, all its components were highly correlated with problem solving. Strong negative correlations appeared with NPO, ICS and AS, whereas PPO and RPS were related to better mental health.

3.3. Structural equation model for the MCS

Because problem solving components were only significantly associated with GH and mental components of health (Table 2), these outcomes were further analysed within structural equation models. However, we chose to use only one dependent variable, the MCS, in order to make the manuscript more readable.

Before running the model, we first calculated partial correlations between problem solving and MCS while controlling for gender, age and the PCS in order to decide which scales of the SPSI-R would be included in the model (Table 3). As all five dimensions of problem solving appeared to be significantly associated with the MCS they were all entered into the structural equation model.

By definition, problem orientation is prior to strategy implementation, and our model reflects this with paths from PPO and NPO to RPS, ICS and AS (Figure 1).

The model showed a good fit ($\chi^2 = 28.842$; $p = 0.025$; degrees of freedom = 16; RMSEA = 0.050; CI = 0.018, 0.079; CFI = 0.974; TLI = 0.958). The R^2 for the model predicting MCS was 0.287.

Figure 1 shows that NPO and RPS were the only significant predictors of the MCS. Significant paths were also obtained between problem solving components. PPO seems to lead to RPS, while NPO predicts a greater use of ICS and AS.

4. Discussion

The aim of this study was to test a new model of problem solving in chronic pain. We expected that the use of a measure of coping based on metaprocesses rather than specific strategies would help us detect adaptive and maladaptive problem solving components.

The results appear to support our hypotheses. Scoring high on negative problem orientation and low on rational problem solving appear to be risk factors for worse mental health. However, positive problem orientation, impulsive/careless and avoidant strategies were also strongly associated with mental health, so these aspects of problem solving should not be dismissed.

Our structural equation model also supports the theoretical assumption that PPO supports healthy functioning by facilitating goal-oriented efforts (RPS), while NPO leads to greater distress by promoting the use of careless (ICS) and avoidant strategies (AS). This provides further evidence for the construct validity of the SPSI-R and sheds new light on the paths that are involved in problem solving.

With respect to strategies that have been associated with worse health, our results are consistent with previous studies that have evaluated similar aspects of coping. NPO seems to reflect emotional and cognitive aspects of the fear of pain, low self-efficacy

and narrow problem formulation, as it is associated with a rigid view of problems as major threats, and the belief that one does not have the ability to deal with these threats [28]. On the other hand, AS seems to reflect behavioural aspect of fear-avoidance, to escaping from the feared situation [8,22,42].

Congruent with our findings, even though fear-avoidance beliefs have been associated with worse pain intensity [7,14,18], they seem to be more strongly related to physical disability [14]. In our study, NPO and AS were also more highly correlated with our measure of perceived disability (PF) than they were with pain (BD). The fact that our measures of problem solving are less related to pain than are traditional fear-avoidance ones might also explain why we obtained weaker associations with pain intensity. By contrast, AS and NPO showed the strongest associations with mental and emotional aspects of health, in line with previous findings [13,18,34]. The aforementioned results are consistent with the idea that problem-solving abilities influence mental aspects of pain-related health, above and beyond pain itself.

As well as NPO and AS, ICS was also associated with worse mental health. To our knowledge this is the first study to explore the effect of impulsive coping on pain-related outcomes. ICS seems to correspond to the rigid and perseverant way of coping described in the misdirected problem solving model [11] and the psychological flexibility model [23,43]. The misdirected problem solving model [11] states that as attempts to solve the problem fail, patients tend to worry and formulate their problem in a narrow and rigid way, a view that matches the concept of NPO. Indeed, our data suggest that this type of formulation (NPO) leads patients to persevere in repeating the same unsuccessful solutions (ICS). Our results regarding ICS would also be consistent with findings obtained within the framework of the psychological flexibility model [43,44], supporting the idea that ICS is a strategy that lacks the capacity to change,

contact with the present moment, and awareness. Although ICS and AS can be viewed as different kinds of problem-solving efforts, we believe that the similarity in the associations obtained for these two strategies are due to common aspects such as unawareness, inflexibility, and a disconnectin from goals.

Another of our aims was to explore whether the use of impulsive coping might explain why some active strategies may have a negative impact on pain. In line with this idea, ICS was the problem solving component that was most strongly related to pain. While acknowledging that causal conclusions cannot be drawn, we believe that this positive association might explain why some active strategies may have a negative impact on health [27] and why some strategies can be either adaptive or maladaptive depending on the context [34,36]. For instance, if adaptive strategies such as exercising or task persistence are performed impulsively, they might have a negative effect on health. Although this is congruent with the misdirected problem solving model proposed by Eccleston and Crombez [11], our study cannot provide further evidence in this regard. We therefore encourage researchers to test this hypothesis.

With respect to adaptive strategies, our results suggest that a positive orientation towards problems and the use of rational strategies may have a positive impact on the patient's perceived health. Regarding PPO, similarities can be found between this concept and that of self-efficacy, since they are both conceptualized as the belief in one's ability to deal with a task despite the difficulties it implies [6,28]. Congruent with our results, self-efficacy seems to be related not to physical aspects of health but, rather, to its mental components [1,3].

The use of rational problem-solving strategies was found to be strongly associated not only with a positive orientation but also with mental functioning. RPS may bear some similarity to processes of psychological flexibility, since they both focus on persisting

or changing one's behaviour according to both the situation and one's goals [43]. Defining and formulating the problem would imply being aware of it, which also seems to be a key aspect of psychological flexibility; specifically, awareness has been argued to impact functioning by widening behavioural options and facilitating flexible and responsive behaviour [43,44]. Note, also, that the generation of alternative solutions, decision making and verification also seem to be consistent with psychological flexibility, as both approaches emphasize the capacity to choose from among a wide range of responses and to do so in line with one's goals [15]. Indeed, RPS is congruent with the psychological flexibility approach as it allows the person to change or persist with his/her behaviour depending on its outcomes in relation to goals. The one key distinction, however, is that these processes within RPS are cognitive and analytic in nature, while in the psychological flexibility the processes emphasized are non-mental, direct experiences, "outside of the mind," so to speak. Whatever the case, our results are in line with those of other studies showing that psychological flexibility is associated with better mental functioning [43,45].

In line with these ideas, the positive impact that PPO and RPS had on mental health in our study would seem to be consistent with the notion that suffering is only likely to be reduced [11] if patients can flexibly change their goals after reframing the problem (RPS). As opposed to the narrowing formulation which we associated with NPO, PPO might lead to a broader view of the problem as an opportunity rather than a threat. This is also congruent with the positive impact that PPO had on RPS in our study.

In sum, our results support a particular perspective on problem solving in chronic pain settings. Of course, to apply a problem-solving framework to chronic pain is not new, as for several decades problem solving has been considered a crucial aspect of cognitive-behavioural treatments for chronic pain [40]. However, some recent randomized

controlled trials (RCTs) do not specifically address problem solving in their treatment programmes [20,37,38,41], while others do not assess problem solving when it is included as part of treatment [10,21,25,26,32]. Therefore, these studies have been unable to explore whether problem solving could be improved and whether such changes would lead to better outcomes.

Results so far suggest that problem solving therapy for low back pain patients has a significant effect on SPSI-R scores [16,31]. However, active physical treatment and waiting list groups also showed similar improvements in NPO [31]. Furthermore, the remaining components were not evaluated in this latter study, so it is still unclear by which mechanisms problem solving components may change in chronic pain patients. Regarding the study by Van den Hout et al. [16], these authors did not explore whether changes in problem solving were responsible for the observed improvement in pain-related outcomes associated with work-related disability. Therefore, it is unclear whether problem solving components act as mediators of the treatment-outcome relationship. This could be tested in RCTs designed to examine mediation.

Our study has a number of limitations. The fact that we evaluated a heterogeneous sample of pain patients means that the results cannot be generalized to all pain populations. Furthermore, the cross-sectional design prevents us from drawing causal conclusions. However, we did address some common methodological shortcomings⁴ by evaluating a large sample and by setting a more restrictive significance level when performing multiple comparisons.

To sum up, the social problem solving model appears to be a relatively comprehensive model of coping in chronic pain, one which includes aspects of fear-avoidance, self-efficacy, misdirected problem solving and psychological flexibility (see Figure 2). Our results suggest that all problem solving components may have an impact on mental

components of health, with a negative problem orientation and, to a lesser extent, a rational problem-solving strategy being the best independent predictors. While a negative problem orientation, impulsiveness and avoidance seem to be dysfunctional approaches to problem solving, a positive problem orientation and rational problem solving are shown to be related to better mental health. This study may have important clinical implications as it provides practitioners with an integrative perspective on general coping that could be used to promote changes in the way patients manage stressful conditions other than pain.

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The authors declare no conflicts of interest.

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